Rapid Assessment Reference Condition Model

The Rapid Assessment is a component of the LANDFIRE project. Reference condition models for the Rapid Assessment were created through a series of expert workshops and a peer-review process in 2004-2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG):

R6GLSF   **Great Lakes Spruce Fir**

General Information

Contributors *(additional contributors may be listed under "Model Evolution and Comments")*

Modelers		**Reviewers**
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Vegetation Type

Forested

Dominant Species*

PIMA
ABBA
PIGL
THOC2

General Model Sources

☑ Literature
☑ Local Data
☑ Expert Estimate

LANDFIRE Mapping Zones

41
50
51

Rapid Assessment Model Zones

☐ California
☐ Great Basin
☑ Great Lakes
☐ Northeast
☐ Northern Plains
☐ N-Cent.Rockies
☐ Pacific Northwest
☐ South Central
☐ Southeast
☐ S. Appalachians
☐ Southwest

Geographic Range

System covers areas in northern Minnesota, Wisconsin, and Michigan with soils that are deeper or finer-textured than soils in the jack pine forest that allowed development of dense forests of mixed aspen, birch, balsam fir, white spruce, and red maple (Frelich, 1998). This community occurs in upland positions, often with loamy shallow soils within bedrock-controlled landforms (Heinselman 1996).

Biophysical Site Description

The spruce-fir PNVG is composed of a mixture of balsam fir, white spruce, paper birch, black spruce, cedar, and quaking aspen (Heinselman 1996). In areas where the landscape was interspersed with small wetlands, tamarack also was an important component of post-fire forests (Frelich 1998). Species dominance was determined by time since past disturbance, incidence of spruce budworm, neighborhood effects of seed source and dispersion (Frelich and Reich 1995), and associated successional dynamics.

Vegetation Description

Almendinger and others (2003, Minnesota Department of Natural Resources) described successional trajectories within this community as having three growth stages separated by two transition periods. Initially, young stands, predominantly aspen with jack pine and birch, dominated for the first 35 years following fire. Then, during a transition period between 35 and 55 years following fire, aspen and jack pine declined and paper birch, white pine, red pine, and balsam fir increased, with establishment of white spruce seedlings occurring. Mature mixed forests composed of paper birch and white pine with a reduced presence of balsam fir, once established, persist up to around 100 years. Another transition period marked by significant increase in white spruce and decline of aspen and birch occurs for a couple of decades. At around 115 years following a fire, stable, long-lived white pine and white spruce dominated the canopy, with lesser amounts of balsam fir and paper birch present as subordinates.

Disturbance Description

Fire Regime Group IV is applicable, with fires occurring every 60 to 150 years and high stand-replacement severity. Severe stand-replacing wind events affect mature stands on an approximate 1,000-year interval.

Adjacency or Identification Concerns

Scale Description

Sources of Scale Data	☐ Literature	☐ Local Data	☐ Expert Estimate

Issues/Problems

Wisconsin and Michigan would include hemlock in the PNVG. Hemlock does not occur in the Minnesota system.

Model Evolution and Comments

Wisconsin and Michigan added to Minnesota, and white pine added to late-seral condition. All other information transferred directly from reference condition modeled by Cleland, Merzenich, Swaty. Suggested reviewers include David Cleland, Jim Merzenich, and Randy Swaty.

Succession Classes

Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).

Class A   30 %

Early1 All Structures

Description

Class A: Early-seral aspen-birch < 40 years. Class A succeeds to mid-age stands (Class B).

Indicator Species* and Canopy Position

POTR5	Upper
BEPA	Upper

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 9

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	100 %
Height	Tree Regen <5m	Tree Tall 25-49m
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform.
Height and cover of dominant lifeform are:

Class B   35 %

Mid1 All Structures

Description

Class B: Mid-age with aspen-birch overstory and mid-tolerant understory (40-100 year. Succeeds to class C. Replacement fires result in aspen-birch. Windthrow returns vegetation to the beginning of this class.

Indicator Species* and Canopy Position

POTR5	Upper
BEPA	Upper
ABBA	Low-Mid
PIGL	Low-Mid

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	100 %
Height	Tree Regen <5m	Tree Tall 25-49m
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform.
Height and cover of dominant lifeform are:

Class C   25 %

Mid2 Closed
Description
Class C: Mid-age stands dominated by white spruce and balsam fir (101-200 years). Succeeds to class D. Higher replacement fire probabilities are due to effects of spruce budworm.

Indicator Species* and Canopy Position

PIGL   Upper
ABBA   Upper
PIMA   Upper

Upper Layer Lifeform
☐ Herbaceous
☐ Shrub
☑ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	75 %	100 %
Height	Tree Regen <5m	Tree Tall 25-49m
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class D   10 %

Late1 Closed
Description
Class D: Old stands > 200 years. End point of succession. Spruce budworm increases replacement fire probability.

Indicator Species* and Canopy Position

PIGL   Upper
ABBA   Upper
PIMA   Upper
PIST   Upper

Upper Layer Lifeform
☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model 8

Structure Data (for upper layer lifeform)

	Min	Max
Cover	75 %	100 %
Height	Tree Regen <5m	Tree Tall 25-49m
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class E   0 %

Late1 All Structures
Description

Indicator Species* and Canopy Position

Upper Layer Lifeform
☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Disturbances

Non-Fire Disturbances Modeled

☐ Insects/Disease
☑ Wind/Weather/Stress
☐ Native Grazing
☐ Competition
☐ Other:
☐ Other:

Fire Regime Group: 4

I: 0-35 year frequency, low and mixed severity
II: 0-35 year frequency, replacement severity
III: 35-200 year frequency, low and mixed severity
IV: 35-200 year frequency, replacement severity
V: 200+ year frequency, replacement severity

Historical Fire Size (acres)

Avg:

Min: 10
Max: 10000

Fire Intervals (FI):
Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class. All values are estimates and not precise.

Sources of Fire Regime Data

☑ Literature
☑ Local Data
☑ Expert Estimate

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	85	50	200	0.01176	100
Mixed					
Surface					
All Fires	85			0.01178	

References

All information transferred from Fire Regime Condition Class (FRCC) Interagency Handbook Reference Conditions. Modelers Davic Cleland, Jim Merzenich, Randy Swaty, Great Lakes Spruce-Fir.